

A Practical Study on the Use of Exercise Prescription Teaching Mode in Physical Education Dance Courses in Colleges and Universities

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Abstract

Study Aim. With the increasing interest and demand for physical dance among contemporary college students, the teaching mode of physical dance courses in colleges and universities needs to be explored and improved. The traditional teaching of physical education dance often lacks a personalised teaching mode, which leads to the limitation of students' interest and learning effect. This study aims to explore the teaching mode of physical education dance courses in colleges and universities, based on exercise prescription and incorporating personalised teaching practices, in order to improve students' learning effect and interest and promote their all-round development. *Material and Methods.* This paper mainly analyses the impact of applying exercise prescription teaching mode on college students' physical health indicators such as body form, physical function and physical quality in the teaching practice of sports dance courses through literature, questionnaire survey, experimental method, mathematical statistics and other research methods, with a view to providing corresponding theoretical basis for the physical and mental development of college students and the further development of sports dance in colleges and universities. *Results.* The results show that the teaching mode of exercise prescription has less impact on the physical form and physical function of college students, and more impact on physical quality, especially the endurance quality, flexibility quality and other physical quality indicators and levels have been significantly improved, and the physical health level of college students has been improved. *Conclusions.* The application of the exercise prescription teaching mode in the teaching practice of physical education dance courses has a positive impact on college students' body shape, physical fitness, cardiorespiratory fitness and psychological fitness, and therefore should be further popularised and promoted in colleges and universities.

Keywords: Sport Dance, Exercise Prescription Teaching Model, Physical and Mental Health of College Students

INTRODUCTION

As the future and cornerstone of the country, the physical and mental health of college students has always been a high priority in China (Borghouts J et al., 2021) (Kivlighan DM et al., 2021). In September, the results of the 8th National Survey on Students' Physical Fitness and Health showed that the physical fitness and health status of Chinese students has generally improved in the last 10 years, but there has been no significant improvement in the physical fitness and health status of the college student population (Department of Physical Education, Health and Arts Education, Ministry of Education, 2021), physical fitness indices such as endurance, strength and speed, however, have declined significantly, lung function is also declining, myopia is still relatively high, and the proportion of overweight and obesity is showing a significant increase in the Chinese university student population. At the same time, mental health problems are becoming more prevalent among this group, while the development of chronic diseases is showing a trend towards a younger age (Wieland DM et al., 2020) (Oswalt SB et al., 2020) (Rabin LA et al., 2021).

With the continuous progress of sports and education reform in colleges and universities, strengthening students' physical quality and promoting the harmonious development of students' physical and mental health has become an important issue that needs to be solved urgently at present. In this regard, schools should change the concept of physical education, deepen the reform of physical education, continue to explore the scientific cutting-edge college sports information teaching research theory, combined with the practice of college physical education curriculum teaching mode optimisation reconstruction, and promote the reform of college physical education teaching evaluation system. Colleges and universities should actively carry out campus sports and health theme education, strengthen physical education classes and various types of extracurricular activities, and formulate personalized teaching programs according to the characteristics of students' physical fitness,

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sports skills, interests and hobbies, so as to let each student fully feel the respect and attention, experience the joy of learning and sports, and deeply understand the benefits of sports to physical health, so as to promote students' adherence to exercise and cultivate a lifelong awareness of sports.

Sports prescription teaching is based on the current physical condition of individual students and follows the principles of individuality, progressiveness and importance, aiming to instruct students through the goal of exercising and enhancing physical fitness, organically combining sports techniques, sports exercise and health education in teaching, and does not require students to have a precise mastery of sports techniques, but rather to take the improvement of physical fitness as the assessment criterion (Peng Jun and Lv Ping, 2002). This is a targeted research for the physical and health conditions of young students. Although it has not been popularised yet, it is consistent with the basic principle of teaching according to the students' abilities, which not only allows students to master the techniques but also improves their physical fitness. Through the application of sports prescription teaching can effectively improve college students' interest in learning physical education classes, mastering the correct exercise methods, and improving the ability to exercise independently, thus promoting the formation of the concept of lifelong sports awareness among students (Yang Wenxuan et al., 2000).

Physical education and exercise prescription play crucial roles in promoting physical activity and improving the physical health of individuals, including students. Pugh et al. (2020) conducted a study to integrate physical activity promotion into UK medical school curricula, testing the feasibility of an educational tool developed by the Faculty of Sports and Exercise Medicine. The study aimed to enhance students' understanding of physical activity and exercise prescription. Gao (2021) implemented an exercise prescription teaching method to improve the physical quality of middle school students, resulting in a significant increase in students' physical fitness after five months of intervention. Carter-Roberts et al. (2021) developed an e-learning resource based on the Faculty of Sports and Exercise Medicine exercise prescription booklet to improve medical students' physical activity prescription skills. The study aimed to explore students' perspectives on physical activity promotion and e-learning, emphasizing the importance of enhancing medical students' ability to prescribe exercise effectively. Capozzi et al. (2022) collaborated to develop key learning objectives for physical activity counselling and prescription in Canadian medical school curricula, aiming to address the lack of education in this area and improve physician education on physical activity. In summary, the use of exercise prescription in physical education is crucial. It helps students deepen their understanding of physical exercise and enhance their ability to develop personalised exercise plans. In order to ensure that students master the core knowledge and skills of exercise prescription, we need to strengthen the research in this field and further improve the relevant curriculum system.

As a comprehensive programme combining sports, music and dance elements, sports dance has rich forms of expression and emotion, which can improve the physical and mental quality and artistic cultivation of college students. However, traditional sport dance courses usually have the problems of single curriculum content, lack of personalised instruction, and inability to meet the needs of different students, which makes it difficult to stimulate students' interest and motivation in learning. Therefore, this study aims to explore the application of personalised teaching practice based on exercise prescription in sports dance courses in colleges and universities. As a personalised and scientific training instruction method, exercise prescription has been successfully applied in the field of sports training. By combining exercise prescription with physical education dance courses, the course content and teaching methods can be tailored according to students' individual differences and learning characteristics to improve students' learning effect and satisfaction. By training 60 first-year students from Shaanxi Normal University for a period of 16 weeks, this paper aims to investigate the practical application effect of the exercise prescription teaching mode in the teaching of physical education dance in colleges and universities, and to explore the personalised teaching strategies under the exercise prescription teaching mode. At the same time, this study will also focus on students' feedback and experience of personalised teaching to better understand their acceptance of the teaching model and assess its effectiveness. Through this study, we can provide empirical research support for the innovation and optimisation of the teaching mode of sports dance courses in colleges and universities, in order to promote students' physical and mental development and healthy growth.

METHODS

Literature and Information Method

We browsed and extensively collected the rich literature involving the teaching of physical dance and exercise prescription from China Knowledge Network, Wanfang Database, Web of Science and many other authoritative network data resources, and then systematically organized the collected literature, and at the same time, we also carried out in-depth analysis in order to understand the actual situation of the physical dance course in a comprehensive and thorough manner. This series of operations also provides a rich reference content and a solid theoretical basis for the successful writing of this study.

Questionnaire Interview Method

Questionnaires were used according to the needs of the study, and the main questionnaires related to students' mental health and motivation for achievement and attitude towards exercise were used. The mental health questionnaire in this study uses the SCL-90 (Symptom Checklist 90) scale, which is a questionnaire instrument capable of comprehensively assessing the intensity of individual symptoms or the state of mental health, and was compiled by the American psychologist Derogatis in 1975, and the SCL-90 scale is applicable to many groups of people, including the college student group. Before and after the experiment, the questionnaire survey of the experimental group and the control group students were conducted respectively, and the resulting survey results were analysed and compared in depth, in order to understand the psychological changes of the students, and to provide relevant theoretical basis and practical basis for the basic research work of this thesis.

Experimental Method

In this study, 60 freshmen students of Shaanxi Normal University were selected as experimental subjects, all of whom were female, in good physical health, with no unsuitable factors for physical activities, and participated in the experiment voluntarily, with no dance fundamentals or other sports specialities. To carry out a 16-week sports dance teaching experiment, two times a week, 90 minutes each time, before and after the experiment on the physical health and psychological quality of the students selected for the test, the class will be randomly divided into the experimental group and the control group each of the two classes, each class of 30 people, the experimental group using the sports prescription teaching mode teaching, the control group using the conventional teaching mode group teaching. The experimental group used the integration of inside and outside the classroom to teach practice methods in the classroom, and let students practice independently according to their personal goals and fitness exercise prescription in the classroom, and used the progress evaluation method to study the achievement of students' learning, and at the same time, observed the changes of students' body shape, physical quality, physical function and mental health and other indicators before and after the experiment, in order to understand the actual effect of the two teaching modes on the improvement of students' physical fitness and skills.

The experiment was divided into 3 processes: (1) Pre-experimental test. Physical fitness indicators were tested on the subjects before the teaching experiment started. Indicators are in accordance with the requirements of the National Student Physical Fitness Standard, including body shape indicators, including height, weight and BMI; physical function indicators, including lung capacity and heart rate; physical fitness indicators, including 800-metre run, seated forward bending, standing long jump; and self-psychological health test. (2) Teaching experiment: the experimental group of students applied the teaching mode of exercise prescription, and the teacher designed a set of fitness exercise prescription (see Table 1) according to the content of students' physical health test and applied it to the teaching content. The control group adopts the traditional teaching mode, using the original teaching content, and the students mainly complete the class practice tasks assigned by the teacher. The sports dance teaching content is designed according to the sports prescription, which requires college students to move in a relaxed and loose manner, so that their muscles and joints are relaxed, and practice with the music after the basic movements are learnt. The content of the course includes a warm-up part, the time is 15 minutes, the music speed is 100 to 120 beats / minute, requiring all parts of the body, joints fully warmed up; the basic part of the 90-minute exercise, the music speed of 120 to 140 beats / minute, requiring full

attention, serious practice; the end of the part of the 15-minute relaxation activities, the music speed of 80 to 90 beats / minute, requiring full relaxation of the body muscles and all parts of the body. The end part is 15 minutes of relaxation activities with music tempo of 80~90 beats/minute, which requires full relaxation of body muscles and all links.(3) Post-experimental testing. After carrying out the teaching, the experimental subjects' body morphology indexes, body function indexes, physical fitness indexes, and mental fitness indexes are tested and the data are recorded. The test indicators are height, weight, body fat, lung capacity, 800 metres running, sitting forward bending, standing long jump, mental health test. The instruments and testing methods were operated by the same person according to the specified requirements. The heart rate at quiet time was measured according to the conventional method of anthropometric measurements. All tests of physical fitness indicators were conducted sequentially for all subjects before and after the experiment.

Table 1 Exercise prescription programme for fitness

	sport event	exercise intensity	Exercise frequency
speed	50 Meters	Physical test score×1.2 time	3 times, with a 1-minute interval
strength	standing long jump	Weight	2,5 times each with 1 minute interval
endurance	400 Meters	Physical test score×1.2 time	3 times with 2-3 minutes intervals
pliable and tough	Sit forward	To the maximum extent of their own	2 groups for 20 seconds without interval

Mathematical and Statistical Methods

All experimental data were statistically analysed using SPSS 22.0, and the significance level P was set at 0.05, with P < 0.05 indicating a significant difference in the results; P < 0.01 indicating a highly significant difference; and P > 0.05 indicating no significant difference.

RESULTS AND ANALYSIS

Comparison of body morphology indexes before and after the teaching experiment between the experimental group and the control group

The results of the comparative analysis of the body morphology indexes of the students in the experimental and control groups before and after the experiment are shown in Table 2.

Table 2 Comparison of body morphology indexes before and after the teaching experiment between the experimental group and the control group

	Indicators of body morphology	Height (cm)	Weight (kg)	BMI(kg/m2)
experimental group	pre-experimental	162.33±4.90	56.42±5.85	21.49±2.25
	post-experimental	163.21±5.14	53.24±6.11	20.03±2.65
control group	pre-experimental	162.14±3.78	55.64±5.36	21.20±3.25
	post-experimental	162.60±4.83	55.21±6.54	21.03±3.11

By counting the height, weight and body fat data of 60 experimental subjects before and after the experiment, the results are shown in Table 2. As can be seen from Table 2, the differences between the body morphometric indicators of the experimental group and the control group before the teaching experiment, as well as the body morphometric indicators of the control group before and after the teaching experiment, were not statistically significant (P>0.05). Although the weight of students in the experimental group decreased after the teaching, the difference was not statistically significant compared with that of students in the experimental group before the teaching (P>0.05). The results show that the teaching mode of exercise prescription has a small effect on the physical form of college students. The indicators that reflect body shape in students' physical fitness test include height, weight and BMI index, of which only weight is intervenable. Whether or not body weight changes depends on the balance between the body's energy intake and consumption, and the intervention of the exercise prescription teaching mode in physical education classes can only increase the energy consumption of students by a small amount, but cannot affect the energy intake of students, so the change of students' body weight is not significant. This may be related to the fact that exercise prescription teaching is only for 1 semester

and the intervention time is short.

Comparison Of Physical Function Indexes Before and After the Teaching Experiment Between the Experimental Group and The Control Group

Table 3 Comparison of physical function indexes before and after teaching between the experimental group and the control group

	Indicators of body functions	spirometry
experimental group	pre-experimental	2708.62±468.03
	post-experimental	3058.84±562.22
control group	pre-experimental	2756.72±310.36
	post-experimental	2765.38±429.74

The results of the comparative analysis of the physical function indexes of the experimental group and the control group before and after the experiment are shown in Table 3. In the physical fitness test, lung capacity is used to reflect the physical function status of the students, and the main influencing factors of the lung capacity are thoracic elasticity, strength of respiratory muscles, as well as gender, body size, and age, etc. The results are shown in Table 3. As an aerobic sport, many of the movements are of high intensity, which require college students to increase the depth and frequency of breathing. As the intensity of movement and the amplitude of thoracic activity increase, the gas exchange volume of each breath will be improved, and the haemoglobin content in the blood will gradually increase, which will make the respiratory muscles gradually strengthened during the continuous exercise, and the body's ability to absorb, transport, store and use oxygen will be improved, and the aerobic endurance will be improved accordingly. As can be seen from Table 3, the lung capacity of the students in the experimental class after the experiment has been improved, showing a significant difference ($P < 0.05$), and the lung capacity indexes of the control class before and after the experiment have also been improved to a certain extent, but there is no significant difference ($P > 0.05$), and it can be seen from the test results that the teaching of exercise prescription has a certain degree of improvement on the students' body functions, especially on their cardiovascular and respiratory systems. Therefore, it can be shown that exercise prescription teaching has a certain promotion effect on improving the lung capacity and cardiovascular function of college students.

Comparison Of Physical Fitness Indicators Before and After the Teaching Experiment Between the Experimental Group and The Control Group

Table 4 Comparison of physical quality indexes before and after teaching experiment between experimental group and control group

	Physical quality indicators	50-meter run	800-meter run	sit-up-and-bend	sit-up	standing long jump
experimental group	pre-experimental	9.14±1.64	242.35±15.03	13.16±6.75	32.11±9.34	156.24±13.34
	post-experimental	8.98±0.53	230.25±11.22	16.35±6.55	38.03±9.02	162.15±12.22
control group	pre-experimental	9.33±0.35	241.83±21.33	13.28±5.73	33.06±9.03	155.22±10.66
	post-experimental	9.18±0.64	238.90±22.11	13.63±5.22	34.66±8.47	157.86±15.58

As shown in Table 4, the differences in physical fitness indicators between the experimental group and the control group before teaching and between the control group before and after teaching are not statistically significant ($P > 0.05$). Except for the 50-metre run, the performance of 800-metre run, seated forward bending, standing long jump and one-minute sit-up indexes of the experimental group after the teaching is better than that before the teaching, and better than that of the control group after the teaching, and the difference is statistically significant ($P < 0.05$). The results show that although the speed quality is less improved, the exercise prescription teaching mode can significantly improve the endurance quality, lower limb strength, flexibility quality and girls' abdominal strength of college students. This may be due to the fact that the content of the exercise prescription set in this study was based on the specialised exercises for the physical fitness indicators of the students' physical fitness test. The enhancement of these exercises in the sport prescription teaching mode not only improved the students' corresponding physical fitness, but also increased their proficiency and

corresponding technical level of the physical fitness test items. Since the 50-metre run is a test item that is difficult to be significantly improved in a short period of time, a longer period of exercise prescription teaching is needed to comprehensively improve the physical fitness of college students.

Comparison of psychological quality indicators before and after the teaching experiment between the experimental group and the control group

Mental health problems of college students are getting more and more attention, and a large amount of data has shown that there are a lot of mental illnesses related to physical health among college students, and this phenomenon has become more and more prominent (Hu Xiaolang, 2007). The contribution of sports to physical health has been scientifically proved, and good exercise habits and reasonable exercise can effectively promote physical health, relieve psychological pressure and regulate psychological state (Hangbo, 2009). Relevant studies have confirmed that no matter what type of sports, all kinds of sports have a good regulating effect on anxiety, depression and other undesirable feelings and states of mind, and can alleviate and regulate the psychological state and produce good psychological effects. In this study, by using the SCL90 symptom self-assessment scale, we measure the psychological health of students in the experimental group and the control group, and compare the effects of the two teaching methods on the experimental group and the control group. The effects of exercise prescription teaching on college students' mental health are shown in Table 5.

Table 5 Comparison of mental health indicators before and after teaching between the experimental and control groups

factor project	experimental group		control group	
	pre-experimental	post-experimental	pre-experimental	post-experimental
somatization	1.48±0.35	1.42±0.43	1.47±0.32	1.45±0.41
forced symptoms	1.99±0.51	1.88±0.61	1.97±0.52	1.89±0.43
interpersonal relation	1.98±0.51	1.76±0.35	1.97±0.43	1.92±0.45
despondent	1.72±0.52	1.69±0.56	1.59±0.52	1.48±0.49
anxious	1.75±0.55	1.53±0.46	1.71±0.45	1.68±0.52
hostile	1.61±0.54	1.56±0.49	1.59±0.52	1.59±0.47
terror	1.55±0.39	1.51±0.42	1.48±0.45	1.45±0.52
bigoted	1.72±0.47	1.46±0.43	1.75±0.52	1.72±0.47
psychopathy	1.57±0.43	1.51±0.45	1.59±0.46	1.52±0.47

As can be seen from Table 5, the scores of all factors of the experimental class students decreased after the experiment, and there was a significant decrease in the factor of interpersonal relationship, anxiety, and paranoia, which showed a significant difference compared with the preexperiment ($P < 0.05$), especially the decrease of the three factors of interpersonal relationship, anxiety, and paranoia was very significant compared with the pre and postexperiment ($P < 0.01$). This indicates that the use of exercise prescription teaching has a better effect on the mental health of college students.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

Through the 16-week exercise prescription teaching experiment, it was concluded that the body morphology indexes of the experimental group had no significant changes before and after the experiment, and there was no statistical significance compared with the preexperiment. The implementation of exercise prescription in physical education class can effectively improve the cardiopulmonary function of college students, promote health, and help strengthen physical fitness. The teaching of exercise prescription not only plays a positive role in the development of college students' physical fitness, but also helps to improve the level of mental health, and has a positive impact on the psychological quality of college students.

Recommendation

When applying exercise prescription teaching, it is necessary to pay attention to the individual differences of students, formulate prescriptions according to specific individuals, achieve unified management and differentiated treatment, so that the health condition of each student can be truly improved. It is necessary to check and measure the implementation of exercise prescription by college students on a regular basis, pay

attention to observing and checking the physiological load and psychological changes of students, and adjust and modify the exercise prescription in time.

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